FATIGUE STRENGTH OF BOLTS

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MOHD ZULKIPLI ABDUL MAJID

Faculty of Civil Engineering
MARA University of Technology
Shah Alam
Selangor Darul Ehsan
MALAYSIA

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ABSTRACT

Fatigue of metals have been studied for the past 150 years but still many uncertainties have not been explored. Despite all the knowledge available nowadays fatigue failure still continue to occur especially in engineering and building construction. The extensive use of metals such as steel in the construction industries and many metal fatigue failure occurrence have lead researchers to focus their studies on the **fatigue strength** of metal.

Bolts are widely used in many types of construction in jointing members of a structure. Thus the study of its fatigue strength are of vital importance. This experimental study carried out was to determine the fatigue strength of **12 mm** diameter **High Strength Friction Grip (HSFG)** bolt under repeated tensile loading (cyclic loading).

Using the stress- life (**S-N method**) the metal specimens were being subjected to a stress within the elastic range of the material. The effect of fatigue parameter, the **mean stress** and **stress range** influence on the resultant lives (**cycles to failure**) of the bolts are studied based on a design monograph known as the **S-N curve**.

Various test have been carried out in the laboratory namely the Static Tensile Test, Fatigue Sensitivity Test and the Fatigue Test using a special machines that was design to perform this test. From this experiments fatigue characteristic and fatigue strength can be observed.

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Chapter 1

1.0 INTRODUCTION.

1.1 General

Metal fatigue is a process which causes premature failure or damaged of a component subjected to repeated loading. It is a complicated metallurgical process which is difficult to accurately described. A lot of this type of failure have occurred in the past especially where metal or steel have been used in building and engineering construction.

Despite of all these failure and complexities, fatigue damage assessment for design of components and structures must be made. Consequently, and over the past years fatigue analysis method to quantify fatigue damaged and fatigue strength have been developed.

At present there are three primary fatigue analysis method. These are **stress-life approach, the strain life approach, and the fracture mechanics approach.**

One of the most important physical observations is that the fatigue process can generally be broken into two distinct phases- **initiation life** and **propagation life.** The initiation life is the development and early growth of a small crack. The propagation life is the portion of the total life spent growing a crack to failure